indirectly, in the matter of giving or not giving new cloths to women after menstruation, but my information on the point is incomplete. Each receives from the temple daily during the festival a fixed quantity of rice, and their families are fed. Thus the tailor, the goldsmith, and the blacksmith, are under obligation to work as it may be required for the temple without remuneration in the ordinary way of labour, but for the honour only.

In the afternoon of the same day (the fifth) the Vannân and a Manûtan, the one following the other and not together, bring two umbrellas to the temple; Vannân bringing one of cloth, the other one of cadjan. I am not sure whether the cloth umbrella has been in possession of the Vannân, but think it has. At all events, when he now brings it to the temple it is in thorough repair, a condition for which he is responsible. The cadjan umbrella is a new one. Following these two as they walk solemnly, each with his umbrella, is a large crowd. There are the usual processions of Bhagavati on the elephant, encircling the temple thrice in the morning, at noon and at night. Nothing more is done on this day.

Early on the sixth day the headman of the Mukkuvans (fisherman), who by virtue of his headship is called the 'Arayân,' together with the blacksmith and the goldsmith comes to the temple followed by an interested crowd, but accompanied by no orchestra of drums. To the Arayân is given half a sack of rice for himself and his followers, a silver umbrella belonging to the temple is handed over to him to be used when he comes to the temple again in the evening. To the blacksmith is given the temple sword. The goldsmith receives the silver umbrella from the Arayân, and excutes on it any repairs that may be needful; and in like manner the blacksmith looks to the sword.

In the afternoon the headman of the Tiyans called the "Tandân," comes to the temple followed by two of his castemen carrying slung on a pole over their shoulders three bunches of young cocoanuts, an appropriate offering, the Tiyans being those whose ordinary profession is climbing the cocoanut palm, drawing the toddy, securing the cocoanuts, etc. This time there will be loud drumming and a large crowd with the Tandân, and in front of him are men dancing about, imitating sword play with sticks and shields, clanging the shields, pulling at bows as if firing off imaginary arrows, the while shouting and yelling *madly*. The sticks represent swords. Then come the blackmith and the goldsmith with the

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and milk products in the State as a result of which people have to lean more heavily on fish and tapioca.

1.36 Among the items of non-food expenditure the significant point is the higher percentage of expenditure devoted to clothing. The neatness and cleanliness of dress worn by the people of Kerala is evident even to a casual visitor to the State.

The Food Gap

1.37 The superior cropping pattern has also brought with it a huge food deficit. In this, Kerala leads all the other States. The current production of foodgrains is estimated at 9.6 lakh tons, whereas requirements on the basis of a norm of 17 ozs. per day would come to about 24 lakh tons, leaving a gap of nearly 14.6 lakh tons. The width of this gap is only partially closed by the consumption of tapioca as part of the diet by poorer sections of the people, although it does form an important second line of defence in the lean years as in 1940's when there was a severe food shortage.

1.38 Wide as the food gap in Kerala is, it has often led to the formulation of solutions which, if given effect to, would be retarding the operation of inherent growth factors in the Kerala economy. Every economy may present some "growth leaders", and development consists in stimulating and invigorating them. The climate and physical formation of Kerala favour the growth of a large number of valuable cash crops. It is this sector to which maximum attention should be devoted. Kerala is better suited to serve the role of an exchange economy which relies for its food requirements on the other parts of India and in return contributes to the economic development of the country by earning valuable foreign exchange through the export of raw and semi-processed commodities.

Other Primary Activities

1.39 Of the other three primary activities, viz., animal husbandry, forestry and fisheries, the former, that is, livestock is rather poorly developed. Due to the poor breed, and the natural deficiency in the livestock feed, the cattle is of poor quality with milk yields much lower than the all-India level. The only exception to this is poultry. Kerala can claim to have the best developed commercial poultry in India, the eggs produced in Kerala going even as far north as Punjab. However, in view of under-feeding and the poor conditions under which the birds are reared, there is still a lot of unexploited potential in poultry development.

1.40 Forestry and fishery are the two other sectors which hold an important place in the economy of Kerala. The forests in the State are rich in some of the valuable species like teak and rosewood. As a result of forest management on scientific lines and the high quality of forest growth, their yield per acre in Kerala during 1955-56 was as high as Rs. 18 against the all-India average of Rs. 5.6. This sector is crucial as a source of supply of industrial raw materials.

1.41 Kerala ranks foremost among the fish-producing States of India. In 1957 total fish landings in Kerala were 3.41 lakh tons. With only 10 per cent of the all-

India coastline, 30 per cent of the country's fish production came from the coast of Kerala. There is, however, still ample scope for increasing the output of fish. Only the fringe of the potential for off-shore fishing has been tapped up till now. Similarly, it is believed that the output of fish can also be increased considerably from the coastal fisheries without subjecting the fishing grounds to undue pressure. Introduction of mechanized fishing and better fishing gear can add considerably to fish production. However, as it is, the fishermen are the most depressed class of persons in the economy, and unemployment is at its maximum among them.

1.42 Development of fisheries is of particular importance in case of Kerala in view of the large food deficit of the State. The requirements of rice for a balanced diet could be considerably reduced if it is adequately supplemented by tapioca and fish. Tapioca by itself is not an adequate substitute for rice requirements since it lacks in proteins. However, its food value can be considerably enhanced if it is combined with a sufficient quantity of fish.

Secondary Sector

1.43 The secondary sector covers mining and industry. Mining activity is comparatively limited in Kerala in view of the meagre occurrence of minerals. During 1955-56 mining contributed only 0.6 per cent of the State Income (all-India 1%). The chief mineral asset of Kerala is the beach sand. Ilmenite is the most important variety of the beach sands. Besides some fine quality china-clay, of which there are good reserves, other items of mineral wealth of Kerala are not of any particular importance.

1.44 The industries of Kerala, both the factory[1] and the non-factory type, are marked by a low level of productivity as shown by Table 4. The main reason for this is the backwardness of technology employed as would be true of other parts of India as well. While this may not apply to the modern industries run on a large scale basis, in some of which indeed the State has been a pioneer, the overall picture of industry presented as a whole is, nevertheless, one of poor technological level. Further, during 1955-56, the organized factory industries employed 17.5 per cent of the working force in the secondary sector (9.7 lakhs) as against 21.8 per cent in India. Moreover, in both the factory and the non-factory categories, the major share of employment opportunities is monopolized by a few industries which can by no means claim to be in the forefront of modern industries.

1.45 In the non-factory sector, out of a total working force of 7.8 lakh persons, almost 50 per cent of the workers are employed in the coir industry, the foremost industry of Kerala. As in most cottage industries, the maximum degree of mechanization in coir industry never goes beyond a spinning wheel. In Malabar, even that is missing, since spinning operations are mostly carried on with hand. Similarly in the factory sector, the three major industries, viz., cashewnut, textile and coir factories which account for 64 per cent of factory employment, are entirely unmechanized.

1 Factory type of units are defined as those falling within the coverage of Section 2 in (*i*) and (*ii*) of the Factories Act, 1948. These include all those factories employing more than 20 workers as well as those employing between 10 to 20 workers, if using power.

Chapter 5

Fisheries

433 226 KERALA IS THE leading fish producing State in India. Its present production of fish amounts to about 310,000 tons. Maharashtra comes next with an output of 210,000 tons. Over 80 per cent (260,000 tons) of the fish landings are obtained from the sea and the rest from inland sources. About 75,000 tons of fish (70,000 tons cured and 5,000 tons fresh) are at present annually exported to other parts of the country, and 2,000 tons (frozen and canned) are sent abroad. Allowing for a very negligible import, the net quantity available for local use comes to 235,000 tons per annum.

262 [171] 5.2 Fish eating is popular in this State. About four-fifths of the population are accustomed to taking fish regularly. At present the per capita consumption of fish in the State is 41.30 lbs. per year for the fish eating population and 33.00 lbs. per year for the total population, as against 9.50 lbs. and 6.10 lbs. respectively for India as a whole.

433 226 [462] [541] [434] [592] 5.3 About 85,000 persons (1.60 % of total labour force) are directly engaged in fishing activities and they produce a net output of Rs. 5.60 crores (1.60 % of State income). The standard of living of an average fisherman in Kerala is very depressed. The average annual income of a fisherman's household in Kerala, consisting of 6.40 members, is estimated at Rs. 542, or only Rs. 85 per fisherman, that is, about one-third of the average per capita income in the State.

PRESENT STATUS OF FISHERIES

Marine Fisheries

5.4 *Coastal Fisheries*: Although Kerala has a comparatively short coastline (10% of all-India) Kerala ranks first in the production of marine fish (about 30% of all-India Production—Table 25). Large marine fish catch can probably be attributed to the much more intensive fishing effort made in Kerala. In 1957, the ratio of man-hours per mile of coastline came to about five times the average for other States. This heavy fishing pressure is paralleled by the high pressure of population on land, leading to an intensive use of the natural resources. Intensive fishing is not only confined to the number of hours of fishing put in, but it also includes the use of more efficient methods. It will be seen from Table 26 that the catch per man-hour of fishing in Kerala compares favourably with that in the other States.

[Tables 25 & 26 appearing on p. 288, have not been processed -- Ans.]

5.5 The average annual landing of marine (coastal) fish is estimated at 260,000 tons (35% of the all-India output) and the gross value of marine catches at Rs. 6.5 crores.

5.6 The catches from coastal waters comprise such commercially important species of fish as Sardines (20%), Prawns (13%), Mackerel (11%), Sharks (5%), Silverbellies (4%), Horse Mackerel (4%), Sole (3%) and Ribbon fish (3%). According to a sample survey conducted by the ICAR in Travancore-Cochin area, about 61 per cent of the total landings are consumed in fresh condition and the remaining part is utilized in various fish-based industries. (An alternative estimate by the State Fisheries Department puts the ratio as fifty-fifty.)

5.7 Dug-out, plank-built canoes and catamarans are the main types of crafts employed for fishing. Dug-out canoes are more popular throughout the State. Boat seines, gill nets, lines and hooks, coast nets and shore seines are the important tackle used in Kerala. Drift nets are used for catching Sardines, Mackerels and Sharks while long lines are sometimes employed for exploiting Horse Mackerels and Shark fisheries.

5.8 During the last decade efforts have been made to introduce mechanized fishing in order to raise the outturn and improve per capita income of the fishermen. Experiments for mechanizing indigenous boats and introducing suitable new types of mechanized crafts have been carried out in the State with the help of FAO experts and the Indo-Norwegian Project. However, unlike Maharashtra, Kerala has made very little progresss in mechanizing its fishing activity. This is mainly explained by the fact that the indigenous crafts in use in Kerala at present, have been found unsuitable for the installation of engines. Thus, to introduce mechanized boats, new boats have to be designed and constructed. As a result of a number of investigations and trials, a few small mechanized boats, ranging from 20 to 26 feet in length, have been recently introduced in the State. The Indo-Norwegian Project has so far issued 88 mechanized boats to the fishermen who completed training with the project. In addition to these, the State Fisheries Department has also issued 39 mechanized vessels. Of these, 25 have been issued to fishermen; of the rest, some are operated by the Department at training centres for transportation of fish and some still remain idle.

5.9 In Kerala, as in some other marine States of India, mechanized boats are issued at subsidized rates to fishermen's cooperatives, groups of fishermen and to trainees who have been trained at one of the two Training Centres in the State. The quantum of subsidies is in line with the all-India pattern, that is, 50 per cent of the cost of engine, 25 per cent of the cost of hull and 33⅓ per cent on that of fishing nets and gears.[1]

5.10 The Indo-Norwegian Project is playing an important role in the development of fisheries in Kerala. The project aims at the improvement of socio-economic conditions of the fishermen. The programme envisages an increase in the production of fish as well as the earnings of the fishermen, improved handling and distribution of catches, the promotion of cooperative activities, and better sanitation and living conditions in the fishermen's villages. The project has also undertaken the supply of fish to the interior areas of the State. It provides most of the basic requirements of

[1] The Indo-Norwegian Project issued nets and gear on 80 per cent and hull and engine on 50 per cent subsidy in the beginning.

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the fishing industry, owns a boat-building yard, a workshop, a cold storage and refrigeration plant and runs a training centre. The fishing villages are thus being developed into what may be called Integrated Fishing Centres.

5.11 *Off-shore Fishing*: An attempt to introduce exploratory and commercial off-shore fishing operations from Cochin port was made by the Travancore-Cochin Government as early as in 1940. A Government sponsored private company operated three large-sized (65 feet to 90 feet) vessels for a time. But these operations proved abortive and were given up owing to lack of trained crew and absence of docking and repairing facilities. Thorough exploratory investigations have been on for the last few years, and at present deep-sea fishing is being carried on jointly by the Government of India and the Indo-Norwegian Project.

5.12 *Chank Fisheries*: With the transfer of some areas of Travancore-Cochin to Madras at the time of the reorganization of States, Kerala has lost some of its important chank fishing centres along the Kanyakumari coast, and only a few centres of lesser importance, Thekkay Kollencode, Poovar, Pulinkudi, Poonthura, Shankumugham and Veri are now left with the State. The right of collection of chanks is annually auctioned on royalty basis, preference being given to cooperatives. The number of chanks collected and the money realized by the cooperatives in 1957-58 and 1958-59 were 26,629 chanks (for Rs. 16,361) and 18,355 chanks (for Rs. 9,177.50) respectively.

Inland Fisheries

5.13 Estuaries, backwaters and adjacent low-lying fields, rivers and canals, ponds, tanks and reservoirs comprise the inland fisheries of Kerala. According to the State Fisheries Department, the total production from these sources is at present about 50,000 tons per annum. This represents only 20 per cent of the total fish production in the State. The inland fish production of Kerala, though much lower than that of West Bengal (12,000 tons), compares favourably with that of Madras (40,000 tons).

Estuaries and Backwater Fisheries

5.14 The more important rivers opening directly into the sea and having permanent link with it are the Periyar, Bharatpuzha, Beypore, Billiapatam and Korapuzha. Regular fishing in the estuaries is done only during the south-west monsoon period (end of May to beginning of August) when fishing activities in the sea, owing to rough weather, are almost at a standstill. The estuarine catches include such varieties as Mullets, Milk Fish, Prawns of different types and Horse Mackerel.

5.15 The backwaters of Kerala covering approximately an area of about 300 square miles, are the most important source of inland fish production. The main areas are Ashtamudy, the Kayamkulam and the Vembanad, all situated in the Southern part of the State. The production from estuaries and backwaters is estimated by the State Fisheries Department at about 46,000 tons per annum. Prawns constitute the bulk of the catch which comprises, in addition to Prawns, Mullets, Bekti, Horse Mackerel and Engraulis.

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5.16 Chinese nets and stake-nets are the most important type of tackles used in the backwaters. There are about 1,180 Chinese nets and 5,400 stake-nets operating in the State. These nets are registered on payment of an annual licence fee assessed on them.

5.17 A large area of low lying paddy fields adjacent to the backwaters is used for prawn culture. The whole area is enclosed with earthern embankments (5 to 6 feet high) provided with sluice boxes for regulating the flow of water. Prawn culture in paddy fields is done on an extensive scale in Ernakulam and Trichur districts. Cultivation in these fields is restricted to a single crop lasting from July to September. The fishing operations in these fields extend from October upto the middle of April. Fishing is done with bag nets, scoop nets and drag nets. The fields are grouped into three classes on the basis of productivity. The average yields per square mile per annum from I, II and III Class are estimated at 1,080 lbs., 680 lbs. and 330 lbs. respectively. The area under the three classes are shown in Table 26.

5.18 About 80 per cent of the catches consist of prawns. On a modest estimate, the total production of prawns from these fields would be of the order of 4,000 tons. The rest of the catch consists of Mullets, Pearlspot, etc. Most of the prawns caught from the fields are cured and exported to the other States in India, Burma and Ceylon.

5.19 There are three brackish water fish farms in the State, one each at Mallapuram, Narakal and Ayiramthenga. The individual areas of these farms are 52.5, 42.5 and 22 acres respectively. An additional area of 28 acres is being converted into a farm at Ayiramthenga. Two more farms with a total area of 64 acres are also to be established.

River Fisheries

5.20 The river fisheries in Kerala are very poorly developed. Out of some 44 rivers traversing the State, only four, viz., Bharathapuzha, Periyar, Pamba and Beypore are more than 100 miles long. The more important fresh-water fish belong to the *Barbus* and Cat fish species.

5.21 There is no systematic fishing in the rivers and only a small number of fishermen are dependent on riverine fisheries. Fishing in the rivers is taken up as a hobby by the local people and the catches are utilized for domestic consumption. No data on production and the number of persons engaged are available in regard to river fisheries.

Culture Fisheries

5.22 There are a number of tanks, ponds and reservoirs in Kerala, covering an area of about 6,000 acres, However, the area suitable for fish culture is much less than this. A recent survey of culture fisheries shows that only about 260 acres out of a total area of 1,227 acres surveyed in Trivandrun, Quilon and Alleppey districts are suitable for fish culture.

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5.23 One of the reasons for the poor development of culture fisheries is the absence of suitable species of fish in the State. However, organized fish culture in fresh waters has been introduced recently. The varieties of fish stocked are Pearlspot, Tilapia, Mullets, all collected locally and major carps obtained from Madras, Andhra Pradesh and West Bengal.

DEVELOPMENT PROSPECTS OF FISHERIES

5.24 Fisheries hold a prominent place in the economy of Kerala. Their basic importance arises on account of three factors (*i*) in a food deficit State like that of Kerala, the shortfall in the local output of paddy can be counter-balanced to a large extent by increased consumption of fish. Being rich in proteins, they can form a valuable supplement to tapioca which is deficient in protein. In fact, a combination of rice, tapioca and fish can form a well balanced diet; (*ii*) some of the important species found in Kerala, e.g., prawns and shrimps are very good foreign exchange earners; and (*iii*) in addition, fishing is a source of livelihood for a large section of the population. The object of fishery development programmes should be to aim at a progressive increase in the catch of fish with a view to promote its consumption within the State as well as to enhance the foreign exchange earnings through the export of Prawns and the other valuable species.

Marine Fisheries

5.25 Considerable scope exists for the development of marine fisheries in the State. For increasing production from off-shore waters more trawlers and other large vessels will have to be operated. While production from the coastal waters could be raised substantially by operating mechanized boats, more trawlers and other vessels will be necessary for increasing the catch from off-shore waters. Introduction of mechanized boats would call for the provision of adequate docking and navigational facilities.

Off-shore Fisheries

5.26 The potentialities of the off-shore fisheries are yet to be determined. Some of the richest Prawn grounds of the world are located off Kerala coast, and Prawns caught there are of excellent quality. Besides Prawns, fairly large quantities of other valuable species are also caught in the off-shore waters. It may, therefore, be useful to undertake shrimp and purse-sienning. It will also be desirable to operate one or two vessels for Tuna fishing on an experimental basis. Tuna is at present landed in small quantities, but it is believed that there are good prospects of large catches in the off-shore and more distant waters. Since both bull-trawling and other trawling have proved almost equally successful in the Kerala waters, it will be desirable to continue and enlarge these operations further.

5.27 The fishing pressure in the off-shore waters of Kerala is at present negligible. Judging by the intensity of fishing in many other parts of the world, it seems likely

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organizational and physical. Most of the fish markets lack such facilities as adequate supply of water, drainage, proper flooring, wire screen, etc. Clean and hygienic conditions for the sale of fish should be created in all the consumption centres. A number of retail and wholesale fish markets should be built at all the major consumption centres. Twenty of these markets may be a good target for the next decade. Provision of fish storage facilities, by way of small refrigerated cabinets is also necessary in retail marketing. The capital cost for building these new markets and providing the storage cabinets would be about Rs. 20 lakhs of which Rs. 8 lakhs may be under the Third Plan. In order to ensure reasonable return to the fishermen it is imperative that cooperative marketing of fish should be expanded as much as possible.

Servicing of Marine Engines

5.53 The programme envisaged for mechanized fishing will call for adequate servicing and overhauling facilities. The Integrated Fisheries Development Centres, where most of the mechanized boats will be concentrated, should have properly equipped servicing stations. At least three such stations may be established by the end of the Third Plan, and another five by the end of the Fourth Plan. Together, the capital cost of these eight service stations will be about Rs. 4 lakhs.

Cooperatives

5.54 Fishermen's cooperatives in Kerala are not well developed. Most of the societies are credit societies. Only three cooperative societies are engaged in the manufacture of nets and two in the marketing of fish. Recently some Producer Cooperative Societies have been organized under the auspices of the Fisheries Department. Nets, boats, etc., are owned by these societies and the members carry on fishing on a cooperative basis.

5.55 Simultaneously with the development of fisheries in the next decade, the fisheries cooperative should also be strengthened. The aim should be to bring the majority of the fishermen within the cooperative fold. The Integrated Fisheries Development Centres should all be organized on a cooperative basis, covering all aspects of the industry.

Staff

5.56 The Fisheries Directorate appears to be adequately staffed for the work it has to deal with at present. However, the implementation of the expanded programme suggested in this report will not only entail a considerable strengthening of the existing staff, but also require certain new categories of technical personnel. It will be especially necessary to provide an adequate staff to man the mechanized boats and the technical services necessary to operate the boats. A number of training centres should be opened to train the fishermen in the art of mechanized fishing. In addition, each of the Integrated Fisheries Centres should have a trained Marketing Assistant to assist the fishermen and their Cooperatives in organizing the marketing of their catches. It

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Other Occupations

Fishing, both sea and freshwater, plays a big part in the life of Kerala but, as usual in India, is primitive in technique and organisation. It has, however, some interesting features: Portuguese influence is obvious in the so-called 'China nets' and the crossbow used for shooting fish from river-banks,[48] and there are many varieties of basket-work fish-traps. The catch of 'sardines' is largely used for manuring coconut; prawns are taken in flooded paddy-fields, the skins used as manure and the pulped flesh exported. Normally Burma was a good customer for prawns; the time of transport raised no difficulty as a high degree of putrescence was regarded with favour.

Travancore has a hydro-electric plant at Pallivasal on the Mudrapuzha River, with a capacity of 21,000 kW which can be increased to 36,000. The power is used for the industries of Cochin town and Ernakulam, of which the production of soap and cosmetics from copra is the most important. It also powers the sole Indian aluminium works, at Alwaye, formerly dependent on imported alumina but now increasingly supplied from Muri in Bihar (591 above); and a recent development is the use of electric pumps for 'de-watering' the *cole* lands. The great reservoir impounding the Periyar headwaters was built to supply irrigation water, by tunnel, to the Madras side, but may possibly be developed for power in the future.

Except for local clays and laterite, the only mineral deposits are the ilmenite, monazite, and zircon sands of the Travancore beaches from Quilon to Cape Comorin. These contain 8–10% thorium oxide and were exploited for the manufacture of gas mantles; the spread of electric lighting ruined this demand, but there has been a remarkable recovery. Titania from the ilmenite and cerium from the monazite are essential to some highly specialised electrical and chemical manufactures (electrodes, tracer bullets, and as a catalyst in benzine synthesis, amongst others) and recent developments in atomic research have made these deposits of great strategic significance. Production, which in 1925 fell to one hundred-weight of monazite, amounted in 1944 to 200,000 tons ilmenite, 2000 monazite, and 1600 zircon.

Population and Settlement

Population problems are very serious in Kerala; the density of Cochin in 1941 was the highest for any political unit in India—953 on a total area of 1493 sq mls—locally reaching 2000–4000 in a purely rural environment. Elankunnapuzha village had in 1941 no fewer than 18,173 people on its 3·8 sq mls—a density of 4782. The rate of increase has been very high—for

[48] A. K. Menon, "Fisheries of Cochin" (*IGJ* XIV (1939)), 229–36; C. D. Forde, *op. cit.*, 269.